Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Journal of the Society of Arts.

FRIDAY, JANUARY 11, 1861.

EXAMINATIONS.—LOCAL BOARDS.

Those Secretaries of Institutions who have not already forwarded Lists of their Local Educational Boards are requested to do so as soon as possible, not omitting to specify the Chairman and Secretary.

Copies of the Programme of Examinations for the present year may be obtained by members of any of these Boards on application to the Secretary of the Society of Arts. In this will be found full instructions for their guidance in making the necessary arrangements for co-operating with the Society of Arts, but should there be any point requiring explanation, the Secretary will be happy to afford it.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following addition has been made to the List of Guarantors and of the sums guaranteed since the announcement in the *Journal* for December 14 :—

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Amount last announced	£370,500	
Augustus Henry Novelli, 43, Russell-square	1,500	Arts.
Total	£372,000	

By Order, P. LE NEVE FOSTER, *Secretary.*

CONDUCTIBILITY OF MERCURY AND AMALGAMS.

By F. Crace Calvert, F.R.S., and Richard Johnson, F.C.S.

The following paper was laid before the Royal Society last session, being the second part of the paper by the same authors on the relative powers of metals, alloys, and amalgams to conduct heat*: —

Having in our former paper described our experiments upon metals and their alloys, we now give the results obtained with mercury and amalgams. The method followed in the investigations described in this paper is the same as that detailed in our former one. When the amalgams were solid, we melted and cast them in square bars, and filed them down until they were 1 c. m. square and 6 c. m. long; but when the amalgam was fluid, we introduced it into the small iron box (described in the former paper) and determined its conducting power.

Before stating the results obtained with amalgams made of pure metals in equivalent and multiple quantities, we wish to draw attention to the remarkable manner in which heat is conducted by mercury.

But before entering into the details of our experiments, it is necessary that we should state that, having completed our researches some time since, we forwarded the result to the Junior Secretary, Professor G. G. Stokes, for presentation, when he kindly made to us the remark that mercury might be a worse conductor than we had found it to be, and that the means adopted by us were not sufficient to prevent the mass of mercury in the little iron box becoming heated through currents; and he suggested that we should tilt our apparatus, and ascertain what would be the influence of various angles on the conductibility of mercury as determined by our method. By following out this suggestion, we were led to the interesting discovery that mercury is the worst conducting metal known, when the heat is so applied as to prevent the mass becoming heated by currents.

To attain this object, we filled our little iron box with pure mercury, and having ascertained by its weight that it was quite full, we introduced 1 cub. cent. of it into each of the vulcanized caoutchouc vessels; we then poured 50 cub. cent. of cold water, and waited until it had arrived at the temperature of the atmosphere of the laboratory. The larger vessel was in its turn filled with 200 cub. cent. of water at 90°. The apparatus was so arranged that the large vessel, or the source of heat, was placed perpendicularly over the small one. The temperature of the large one was maintained at 90° during one-quarter of an hour by a small jet of steam brought into it when we obtained the following results:—

	Temperature of the 75 cub. cent. at beginning of experiment.	Temperature of 75 cub. cent. at end of 15 minutes.	Conductibility found reduced to 50 cub. cent. water.	Mean.	Silver 1000.
Mercury vertical ...	14°·8 12·6	16°·0 13·7	1·80 1·65	1·7	54

---

* See *Journal* Vol. VII. pp. 677, 687.

We also tilted the apparatus and gave it gradually different angles, and the conductibility of heat by mercury gradually decreased as the angle increased, showing the following results:—

		Silver 1000.
At a slight angle	13·5 ...	423
Angle slightly increased ...	7·3 ...	229
Angle still more increased ...	6·9 ...	216
Considerable angle	5·1 ...	160

Lastly, the apparatus was used as in our former experiments, the little box being placed in a horizontal position, and the results agreed with those already published; for we obtained

	Mean.		Silver 1000.
21·6	21·63	or	676
21·8			
21·5			

There cannot therefore be a doubt that the supposed good conductibility of heat by mercury arose from not taking into account that mercury being a fluid, its facility to conduct heat was owing to currents. The same may be said of water; for we have observed, as is already known, that it presents a complete barrier to the conduction of heat when the source of heat is applied at the upper part of a column of water. Thus in our experiments we have found that the temperature of the water in the lower vessel did not rise one-tenth of a degree during the quarter of an hour that the water in the upper vessel was maintained at 90° C.

The bad conductibility of heat by fluids when all currents are prevented in their mass, appears to us difficult to explain by the theories of undulation or radiation; for we cannot understand why the imponderable fluid caloric should not travel equally well between the molecules in whatever way the source of heat is applied, or why the undulations should not be as rapid, nay, more rapid in a fluid than in a solid. All these difficulties disappear if we adopt the views of Mr. J. P. Joule, F.R.S., which are that heat is conveyed in bodies by the vibrations of the solid molecules composing them.

The remarkably low conducting power of mercury presents another point of interest, as it establishes a further analogy between heat and electricity. The ratio of conductibility of these two agents by mercury, as compared with that of silver, shows such close relations when examined under the same volumes, that they deserve especial notice. Thus:—

	Heat.	Electricity.
Silver	100·00 ...	100·00
Mercury	5·33 ...	2·12

On the Conductibility of Solid and Semi-solid Amalgams, or those in which exists an Excess of the Amalgamated Metal.

The amalgams belonging to this series were prepared with equivalent quantities of pure metals, and their conductibility for heat confirms the figure (54) which we now publish as representing the conductibility of mercury, silver being 1,000. In fact the observed conductibility of heat by these amalgams agrees perfectly with the theoretical quantities, whilst there exists a great difference between them when we adopt 677 as representing the conductibility of mercury. The calculated numbers are obtained, as in the former paper, by multiplying the conducting powers of the respective metals by the weight, and dividing by the sum of the weights.

Amalgams of Tin.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes from 5 to 5 minutes.			Found.	Mean.	Calculated, mercury being 1·7.
	°	°	°	°	°			
$HgSn_2$ Hg 45·88 Sn 54·12	15·0 14·8	14·5 14·6	18·0 18·2	20·8 20·9	23·1 23·3	8·6 8·7	8·65	8·11
$HgSn_3$ Hg 36·18 Sn 63·82	15·0 15·0	15·1 15·5	18 9 19·4	21·9 22·3	24·5 25·0	9·4 9·5	9·45	9·2
$HgSn_4$ Hg 29·84 Sn 70·16	14·0 15·0	13·1 14·9	16·9 18·8	20·1 21·9	22·8 24·5	9·7 9·6	9·65	9·95
$HgSn_5$ Hg 25·38 Sn 74·62	16·0 16·0	14·9 15·11	19·1 19·4	22·5 22·8	25·2 25·4	10·3 10·3	10·6	10·5

Amalgams of Zinc.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes, from 5 to 5 minutes.			Found.	Mean.	Calculated, mercury being 1·7.
		°	°	°	°			
$HgZn_2$ Hg 60·63 Zn 39·37	...	16·0 15·3	19·6 18·9	22·8 22·2	25·6 25·1	9·6 9·8	9·70	8·97
$HgZn_3$ Hg 54·70 Zn 45·30	...	16·1 17·1	19·7 20·9	23·4 24·5	26·6 27·5	10·5 10·4	10·45	10·05
$HgZn_4$ Hg 43·50 Zn 56·50	...	14·3 17·5	18·4 21·0	22·1 25·2	25·4 28·4	11·1 10·9	11·00	12·08
$HgZn_5$ Hg 38·11 Zn 61·89	...	17·1 16·2	22·6 21·7	27·2 26·3	31·0 30·2	13·9 14·0	13·95	13·05

Amalgams of Bismuth.

Formula of amalgams, and per-centages.	Exterior temperature.	Temperature of the 50 cub. cent. of water before experiment.	Temperature of the 50 cub. cent. of water after 15 minutes, from 5 to 5 minutes.			Found.	Mean.	Calculated. mercury being 1·7.
	°	°	°	°	°			
$HgBi_2$ Hg 31·82 Bi 68·18	15·5 15·5	15·2 15·3	16·9 17·1	18·4 18·5	19·8 20·0	2·1 2·2	2·15	1·87
$HgBi_3$ Hg 23·86 Bi 76·14	15·0 15·0	14·8 14·7	15·7 15·6	16·6 16·6	17·4 17·3	2·6 2·6	2·6	1·89
$HgBi_4$ Hg 19·03 Bi 80·97	14·5 14·8	14·9 15·0	15·8 15·8	16·7 16·6	17·5 17·5	2·6 2·5	2·55	1·90
$HgBi_5$ Hg 15·82 Bi 84·18	13·0 13·5	13·6 13·4	14·35 14·25	15·2 15·1	15·9 15·8	2·3 2·4	2·35	1·91

On Amalgams which contain an Excess of Mercury.

These amalgams, also prepared in equivalent quantities, were all fluid, owing to the circumstance that the proportions per cent. of mercury predominated over those of tin, zinc, and bismuth. The conduction of heat by these amalgams was therefore determined in the small iron box placed perpendicularly, and the source of heat applied at the upper part of the column; and this mode of operating has led us to observe the curious and interesting fact, that all this class of amalgams have the same, or nearly the same, conducting power, viz., from 1·9 to 2·3, although the proportions of tin vary in them from 10·52 to 22·98; those of zinc from 6·09 to 13·97; and those of bismuth from 17·55 to 34·73. All the results obtained with these amalgams being within the limits of 1·9 to 2·3, we think it useless to give the details of the experiments.

Conductibility of Compound Bars.

In our fomer paper we described some experiments which we had made with bars composed of small cubes of copper soldered alternately with cubes of zinc, tin, and lead, having 1 c. m. of surface, and we showed that such compound bars conducted heat as indicated by theory. Since then we have pursued our researches, and have found that when compound bars are made of cubes of copper and bismuth, or of copper and antimony, then they conduct heat no longer in relation with the calculated numbers, as for instance—

		Found.	Calculated.
No. 1 bar	3 cubes of Copper, 1 cub. cent. 3 cubes of Antimony, 1 cub. cent.	9·45	17·32
No. 2 bar	3 cubes of Copper, 1 cub. cent. 3 cubes of Bismuth, 1 cub. cent.	3·40	13·25*

It will no doubt be remembered that we also experimented upon bars which, instead of being composed of cubes, were made of two longitudinal bars of copper, juxtaposed and soldered to two other longitudinal bars of either tin, zinc, or lead, and that all these bars conducted heat is if they had been entirely composed of pure copper, and had not contained half their bulk of tin, zinc, or lead. We have made, since those results were published, a great number of experiments, with the hope of throwing some light on the above interesting fact, but we regret to say without success. We have, however, noticed a result which deserves to be recorded; it is, that a bar composed of 2 of bismuth and 2 of antimony, juxtaposed and soldered together, is the only one which conducts heat in the same ratio as indicated by theory; for example—

		Found.	Calculated.
No. 3 bar	2 bars of Bismuth 2 bars of Antimony	3·90	3·63

We have also ascertained that the fine film of solder existing between the blades exerts no influence whatever on the proportion of heat conducted by the compound bars, for we have—

No. 4 bar soldered { 2 of Copper, 2 of Zinc } gives 26·35.

No. 5 bar, in which gutta percha was employed to keep together the four small blades ... ... { 2 of Copper, 2 of Zinc } gives 26·35.

THE SPEED OF ARMOURED SHIPS.

By Charles Atherton, Chief Engineer of H.M. Dockyard, Woolwich.

The properties of armoured ships as respects the desirableness of high speed having engaged public attention, and popular impressions with reference to the conditions under which progressively increasing rates of speed are to be obtained being extremely indefinite and generally erroneous, I beg to offer a few remarks, in the hope of elucidating this subject, for which purpose the data of construction and equipment of the *Warrior*, as published in the *Times* of the 29th ultimo, and in the *Mechanics' Magazine* of the 4th instant, afford an eligible opportunity. Assuming these data to be authentic, it appears that the load displacement of the *Warrior* will be 9,000 tons; that the engines, of 1,250 nominal horse-power, will weigh 950 tons; that the stowage for coal, 950 tons, is enough for rather more than 6 days' consumption, say 6¼ days, being at the rate of 152 tons per day, or 126·66 cwts. per hour, and that the speed of the ship is expected to be at the rate of fourteen knots per hour.

These data assign to the *Warrior* prospectively a very high scale of dynamic duty with reference to the consumption of fuel, for when judged of by the formula $\frac{V^3 D^{\frac{2}{3}}}{w} = C$ (w being the consumption of coal per hour expressed in cwts.), the co-efficient C becomes C=9333, which is, I believe, higher than has hitherto been realised by the continued sea-service of any ship, and is identical with that on which Coal Table No. 3, "Steam Ship Capability," p. 96, has been calculated, demanding a combination of excellence in hull and engine construction of which it is to be hoped the *Warrior* will be an example.

---

* These numbers were calculated in the same manner as in the case of alloys. It has been pointed out to us that in the case of the bars composed of different metals placed end to end, the theory of the conduction of heat leads to the following simple result:—the resistance of the whole bar, multiplied by its whole length, is equal to the sum of the specific resistances of the separate metals multiplied by their respective lengths, the resistance being measured by the reciprocal of the conductibility. This gives for the conductibilities of the bars Nos. 1 and 2, the reciprocal of the mean of the reciprocals of the conductibilities of the two component metals. Taking the numbers given in the former paper, copper (rolled) 26·95, antimony (mean of two) 6·485, bismuth 1·95, we thus find for bar No. 1, 10·45, for No. 2, 3·64, which do not greatly differ from the numbers given by experiment.

It also appears that the weight of armament of the *Warrior*, which, combined with the endurance of the ship at full speed, may be regarded as the measure of the effectiveness of the ship for aggression, will be 1,500 tons; consequently, the weight of the hull of this armoured ship of 9,000 tons load displacement, after deducting weight of engines, coals, and armament, will be 5,600 tons, or 62 per cent. of load displacement of the ship, being from 15 to 20 per cent. heavier than ships of the same load displacement of ordinary build, and this it is which, in combining high speed with long endurance under steam, causes the necessity of unusual magnitude in the construction of armoured ships.

Seeing, now, that various steam-ships attain the speed of 18 knots per hour—for example, the Holyhead and Dublin mail packets—and that high speed has been much insisted upon as essential to the efficiency of armoured ships, my object now is to demonstrate the conditions of construction as respects size and power which would be required in order that an armoured ship of the *Warrior* type might attain the speed of 18 knots per hour, and carry an armament of 1,500 tons weight, and coal enough to steam at the reduced speed of 14 knots per hour continuously for 6¼-days, thus possessing the same progressive power, and the same steaming endurance at 14 knots per hour as the *Warrior*, but in addition commanding the speed of 18 knots per hour, when so required, so long as her coals will last.

To increase the speed from 14 to 18 knots per hour may appear, at first sight, to be a simple matter—merely demanding that the engine power should be increased in the same proportion—but the fact is, that the engine power, and consequently the weight of the engine, would be required to be increased in the proportion of the cubes of the speeds, thus demanding an increased size of ship, as measured by load displacement, to carry the increased weight, and this increased ship again demanding still further increased power to attain the required speed; thus the problem becomes complicated, but the following calculation, chiefly deduced from the tables before referred to ("Steam Ship Capability," page 96, second edition), shows that, in order to realise the before-mentioned conditions, the load displacement of our armoured ship requires to be increased from 9,000 to as much as 15,000 tons. For example: assuming 15,000 tons to be the required displacement, the weight of the hull at 62 per cent. will be 9,300 tons; the engine-power required to propel this ship of the *Warrior* type, at the speed of 18 knots per hour, will, by received rules in steam-ship dynamics, be three times that required to propel the *Warrior* of 9,000 tons at 14 knots per hour; and the weight being increased in the same proportion, we have 2,850 tons as the weight of the engines; also, by the formula $\frac{V^3 D^{\frac{2}{3}}}{w} = 9333$, the assumed co-efficient of the *Warrior*, the weight of the coal (w) to propel this ship of 15,000 tons displacement at 14 knots per hour will be 178·33 cwts. per hour, or 214 tons per day, at which rate the quantity required for 6¼ days' consumption will be 1,338 tons. Hence, we have weight of armoured hull 9,300 tons; weight of armament 1,500 tons; weight of engines for steaming at 18 knots per hour 2,850 tons; coal for 6¼ days steaming at 14 knots per hour, 1,338 tons; making the total load displacement 14,988 (say 15,000) tons. The displacement of the Holyhead and Dublin Mail Packets, when steaming at the speed of 18 knots per hour, is understood to be about 2,500 tons; but in this case the weight of hull probably does not exceed 40 per cent. of the load displacement; the cargo consists merely of a few passengers and mail-bags, and the coal is only required to be sufficient for about six hours' consumption, which conditions are altogether different from those required in armoured ships of war.

The comparative steaming endurance of the two ships now under consideration would be as follows:—

"Warrior,"	"Warrior," enlarged,
as constructed for 14 knots speed, with 9,000 tons displacement. Coal, 950 tons.	if constructed for 18 knots speed, with 15,000 tons displacement. Coal, 1,338 tons.
At 10 knots, the consumption would be 55·6 tons per day, lasting 17 days.	At 10 knots, the consumption would be 78·2 tons per day, lasting 17 days.
At 12 knots, the consumption would be 96 tons per day, lasting 10 days.	At 12 knots, the consumption would be 135 tons per day, lasting 10 days.
At 14 knots, the consumption would be 152 tons per day, lasting 6¼ days.	At 14 knots, the consumption would be 214 tons per day, lasting 6¼ days.
Above 14 knots not attainable, the engine-power being limited to that speed.	At 16 knots, the consumption would be 320 tons per day, lasting 4 days.
	At 18 knots, the consumption would be 456 tons per day, lasting 3 days.

Thus we see that the steaming endurance of the two ships would be equal up to 14 knots per hour, but that, in order to attain the superior capability of steaming for three days, at the speed of 18 knots per hour, we require to increase the size of the armoured ship from 9,000 to 15,000 tons load displacement, and to treble the engine power, whereby the cost of the ship would be probably doubled—or two such ships as the *Warrior*, limited to 14 knots speed, would be built for the cost of one ship constructed for 18 knots, though limited to the same amount of armament—1,500 tons—and the same steaming endurance, viz., 6¼ days at the speed of 14 knots per hour. The question therefore becomes, Whether two ships of the capabilities of the *Warrior*, as now constructed for 14 knots speed, would, in their co-operation, be more or less effective than one ship constructed for 18 knots speed, but carrying only the same armament—a question most interesting to naval men—but in regard to which my object has been merely to open up the mechanical considerations of the case. Practically, there is no limit to magnitude and speed; it is a mere question of money; and, whether ships be built of wood or of iron, is, practically, a mere question of appliances and tools.

Woolwich Dockyard, Jan. 8, 1861.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(*Continued from page* 99.)

India Rubber.—The demand for india-rubber, the principal and staple product of Para (Brazil) has diminished, and is diminishing, in consequence, in a great measure, of the quantity produced on the west coast of Africa and our East India possessions, and in some degree from its having for many purposes been superseded by gutta-percha, and its application to other purposes relinquished. It is now at least 120 per cent. cheaper than it was in 1854.

Coal.—It is now evident that a grand coal-field exists at St. Catharines (Brazil), of sixty leagues, in an east and west direction, that is, from the sea-coast of the Atlantic Ocean to St. Gabriel, and perhaps much further; and along the coast, probably 140 or more leagues, beginning from Laguna, in the province of St. Catharine, and continuing south almost to Monte Video. These mines of the Erral, so called, are not of the best quality, but they have not been explored beyond thirty yards in depth, because coal has been found at Arroio dos Katos, much more convenient to the village of Sao

Jeronymo, situated on the margin of the River Jacuhy, and the nearest place for embarkation being only two leagues, whilst the mines of Erral are ten leagues off. Sao Jeronymo is twelve leagues from Porto Alegre, situated on the left-hand side of the river, just opposite Triumfo, called in most of the maps Villa Nova. At Arroio dos Katos, the first seam of coal was found by boring-rods, at forty-five yards deep, and the seam is five feet in thickness. It is steam coal of very good quality; some hundred yards of galleries have been worked, which have supplied the steamers of the province. Forty yards below this seam another four-feet seam has been discovered, of even better quality than the five-feet seam. There are many leagues of these two seams. Coals have also been found in many other parts.

Hydraulic Limestone.—A bed of hydraulic limestone, twelve feet in thickness, has been discovered near to the village of Sao Jeronymo. It has been proved at the lime works of Rio de Janeiro, by Mr. Charles Neate. He found the sample to be equal to the Welch lime they are now using in making a dock wall in that city.

Algeria.—A regulation was promulgated on the 30th March, 1857, prohibiting the cooking of provisions or the melting of tar on board merchant vessels or on the quays, except in the public kitchens or fire-places established on shore. The charge is fifteen centimes, or 1½d., for each fire-place used for each meal, and fifty centimes, or 5d., for each cauldron of pitch, tallow, or tar melted in the fire-place. Merchant, steam, or sailing vessels are now allowed to have provisions cooked on board by having a guard at the rate of three francs a day.

Minerals, such as copper, iron, lead, zinc, antimony, and mercury are found in Algeria. The most considerable are those of copper, near Tenes, and of mouzaia, near Blidah, in the province of Algiers, from which a considerable quantity is exported annually to Swansea. All other exports are almost exclusively for France.

Trade Guilds.—In Frankfort the privileges enjoyed by the several guilds stand most materially in the way of the otherwise increasing prosperity of the town. A citizen who takes up his freedom for a particular trade or profession must confine himself exclusively to that particular trade, and cannot combine any other trade with it. For this reason, no manufacturer of carriages, or railway carriages for example, can exist there, because the tradesman, supposing him to be a saddler, must employ a blacksmith for the iron and a wheelwright for the wooden material of his carriages.

Spirit from Currants.—At Patras (Greece) a Joint-Stock Company is being formed, under the auspices of the Government, for distilling wine and spirits from the inferior descriptions of currants, and it is proposed to bring clever workpeople and manufacturers of wine and spirits from France and Sicily.

Gold.—Sofala is situated at the mouth of a river of the same name, in latitude 21 deg. 11 min. south, and longitude 34 deg. 45 min. east. The Sofala river leads to the auriferous portion of Eastern Africa. Solfa is by some considered the ancient Ophir of Solomon, in whose days ships were sent from Tarshish to obtain gold from mines which are even now as productive as ever, but entirely neglected. The only gold at present sent from Sofala is a small quantity occasionally picked up on the surface of the earth after heavy rains. On both banks of the river Sofala, and from that river northwards to the southern bank of the Zambesi, the country is one mass of mineral wealth—gold, silver, copper, and toward Tete even iron and coal being found in abundance. Ruins of cities, once the dwelling place of nations mighty in their industry, are to be seen in this region—perhaps telling the history of those who provided gold for the Temple of Solomon.

Products of Angoxa.—The kingdom of Angoxa, latitude 16 degrees 39 minutes south and longitude 39 degrees 46 minutes east, having a seaboard of 90 miles, and reaching into the interior for upwards of 180 miles, has in a few years, by abandoning the Slave Trade, and developing the resources of its natural productions, risen to the position of a free and independent kingdom, whose trade is open on its express invitation to the civilised world. Already it supplies immense quantities of simsim, or sesame, or *gergulin* seed, which appears here particularly to thrive, the oil from which is a valuable article of commerce, being used as a substitute for olive oil, and much prized for the finer portions of machinery. Ivory in abundance; ebony, orchilla weed, gum copal, cocoa-nut oil, coir, and ground nuts, form the principal portions of the cargoes of fleets of Dhows trading in the season between Angoxa and the dominions of the Imaum of Muscat.

Gold, Silver, and Malachite.—The natives from the far interior bring down to Messourie, on the mainland opposite the city of Mozambique, every year gold, silver, ivory, wax, skins, and malachite, the latter in considerable quantities, showing that there are mines of copper in the Monomoises country. When Mozambique was in the hands of the Arabs an important trade was carried on between Arabia and India, but for the last 200 years, under its present rulers, the trade, principally carried on by Banyans to Cutch and Goa, has been gradually decreasing. At present it exports of ivory annually 250,000 lbs., beeswax, sesame seed, orchilla, rhinoceros horns, cocoa nut oil, castor oil, ground nut oil, cork, arrowroot, sago, coffee, tortoiseshell, indigo of an inferior quality, from ignorance in manufacturing it, and a spirit made from the cachu.

Cloves.—The cultivation of cloves was introduced into Zanzibar, lat. 6 deg. 28 min. south, long. 39 deg. 33 min. east, from the Mauritius in 1818. They thrive so well that the cultivation of them has, in a great measure, superseded that of the sugar cane, and even the cocoa nut.

Yellow Bark.—In the Island of Madagascar there is produced a yellowish red bark, inside looking very much like saffron; outside it is grey, and is estimated at £40 sterling per ton. Gutta percha is also to be found in abundance, being the gum from Bois de Natte.

Nut-galls.—At Latakia, in Turkey, nut-galls, and wax, can be had for the gathering; also cochineal, but they are not now collected. Ibrahim Pacha forced the peasants to gather all three.

Leather.—A considerable quantity of skins of the wild boar are sent from Latakia to Mount Lebanon, where they are tanned, and then sent back to Latakia. The leather is used for the soles of shoes. Abundance might be had for export. Saddlers there do not make use of them.

Cotton.—15,000 cantors of cotton are produced yearly at Orfa, in Turkey, but none is exported, as the people do not understand the separation of the seed. The cantor contains 180 okes. The market price is 200 piastres per cantor.

Ancient Vases and Gold Ornaments are often picked up by the inhabitants of the Island of Astropalia or Stampalia, in the Ottoman Archipelago. It is a singular fact that no serpents or reptiles exist on the island, and although they are sometimes found among the firewood which is imported, they do not live.

Anchors.—It would be an immense advantage to the inhabitants of the island of Cassos if chain-cables, anchors, and other ship's gear were taken direct to Cassos. They are at present obliged to get them at Syra.

The Mineral Products of the island of Cyprus have hitherto been unexplored. It is, however, certain that many mines would be discovered of sulphur, coal, copper, iron, and perhaps also gold and silver. Romance speaks much of treasures concealed in the isle of Cyprus. The island possesses two rich natural salt pits, one of which is situated half a league from Larnicu, and the other a third of a league from Limasol. There are also coloured earths, trees, and roots, adapted for dyeing, and medicinal plants; pot herbs grow wild in the fields and prairies, while on the hills exist rich pastures which would feed numerous flocks. The island produces wool, cotton, alizaris (madder) silk, flax, sesame, tobacco, colocynth, oil, wine, figs, currants, oranges, honey, pitch, skins of sheep and hares, yellow, red, and green umber, butter, and cheese. There is not a single bank in all the island; the want of an establishment of the kind is sensibly felt. The present state of Cyprus is that of a country which once was celebrated, rich and populous, which now is but the shadow of its former days, but for which a better destiny may be reserved.

Flavour of Mutton.—The flesh of the sheep of the island of Halki is highly esteemed, it having a delicious taste, in consequence, it is said, of the animals drinking only salt water. This fact is said to be well attested.

Emery Mines.—A few years ago some emery mines were discovered in the Island of Leros, but they are not turned to any account. There is a castle on the mountain, overlooking the village, in good condition; built by the Knights of St. John, erected, from all appearances, on the ruins of a large ancient Greek edifice. Inside the castle there is an immense tank, in perfect repair, which is used now, as it was, no doubt, formerly, to hold rain water. Within this castle a granary was lately found full of Indian corn, supposed to have been there since the time of the Knights, which was, of course, unfit for use.

Marble.—There are quarries of the finest marble in the largest of the Fourni Islands. About thirty years ago a beautiful marble statue was found among some ruins near Phanari, which the people of that village broke to pieces. Some remains of ancient Greek towns are visible. An Hellenic architect, of Tinos, wished lately to make a contract with the proprietor of the island for a supply of the marble, but they could not come to terms.

Gum Mastic is obtained from a tree of the same name. The tree rarely exceeds 8 feet in height; its leaves are evergreen, and resemble those of the turpentine tree. Mastic is one of the principal resources of the Island of Scio. To extract the gum, incisions are made on the main trunk of the tree, and from them the gum issues. Previous to 1850, the trees produced from 45,000 to 50,000 okes; but in consequence of their being killed by frost in that year, the quantity was greatly reduced, but, in 1858, 20,000 okes were collected. The Mastic tree cannot be cultivated except in the north part of the island, and all attempts to propagate this tree, whether in other parts of the island, or in other countries, have totally failed.

Brandy.—The brandy of the Island of Scio is considered the best in Turkey, chiefly on account of the mastic put with it, which gives it a peculiar flavour. It is sent to Constantinople to the value of nearly one million piastres yearly.

Saw-Mills.—The number of saw-mills in the State of California, U.S., is 388, of which 178 are propelled by steam and 210 by water; and their aggregate capacity is 500 millions of feet (board measure) per year.

The Climate of South Carolina.—The climate of this region is healthy during the winter months, but deadly to whites from May to October, a single night passed on a rice plantation being sufficient to induce an attack of the so-called "country fever," a bilious fever of the most malignant type, more dangerous even than the yellow fever.

Shells.—From Cape St. Sebastian to St. Augustine's Bay, Mozambique, the French carry on a trade in shells called *casques*, used in the arts.

Cowrie Shells.—One Hamburgh house sends annually fourteen vessels to Zanzibar for cargoes of cowries, with which they proceed to the rivers on the west coast of Africa, and purchase cargoes of palm oil.

Trade Law.—At Odessa, according to the general Russian law now enforced, the permission to trade or to carry on any sort of retail business is strictly limited to the members of three guilds paying a certain annual tax, and becoming thus possessed of specific rights. A first-guild merchant may transact business to any amount with foreign countries, or with the interior. He pays 979 roubles 15 copecs, or £150 12s. 9d. annually, and may open three shops for the sale of goods by retail. The first guild now consists of twenty-five merchants, of whom five are Hebrews.

FINE ARTS IN IRELAND.—TAYLOR PRIZES AND SCHOLARSHIP.

By the will of George Archibald Taylor, Esq., late of Dublin, the sum of £2,000 was placed at the disposal of his Executors for the promotion of art in Ireland; and, in pursuance of his enlightened design, a perpetual endowment has been established for the encouragement of Art-Students, in the manner and according to the terms and conditions following:—

1. The general management of the scheme is entrusted in the Royal Dublin Society, in conjunction with the Executors and Trustees of the will for the time being.

2. The fund will be invested in Government stock to the credit of Charles Edward Bagot and Charles Leech (or other the trustees or trustee for the time being of said will), and of the Royal Dublin Society. An account of its administration will be printed every year with the proceedings of the Society; but the fund shall at all times be kept separate and apart from the general funds of the Society.

3. The dividends will be applied, after providing for the necessary expenses of the trust, to the endowment of scholarships and money prizes, which will be open to all students of art, of either sex, who shall have attended for two years at least a school of art in Ireland, or who, being of Irish birth, shall have attended for the like period a school of art elsewhere, and who shall produce at the exhibition hereinafter mentioned works of art displaying conspicuous merit or high promise of future excellence.

4. An annual exhibition will be held in Dublin of the works of art which shall be sent in for competition, and public notification will be given at least six months previously of the scholarships and prizes to be competed for, and of the regulations and conditions to be observed at such exhibition.

5. The subjects for competition will from time to time be defined and determined by the Trustees.

6. The amount of the money prizes will be in the discretion of the Trustees, having regard to the merit of the works exhibited; and when high artistic talent shall be manifested, one or more scholarships (to be called the Taylor Scholarship) of £20 or upwards may be awarded, which may be held for a second and a third year, provided the student shall produce in each year a work of sufficient merit.

7. The prizes and scholarships will be withheld in whole or in part, when there shall not be adequate merit in the works exhibited; and the amount so reserved will be added to the principal of the fund.

8. The prizes and scholarships will be awarded upon the report of judges, of whom one shall be chosen by the Council of the Royal Dublin Society; another by the Royal Hibernian Academy; and a third by the Governors and Guardians of the National Gallery of Ireland. Should the names of the judges not be returned to the Royal Dublin Society at least one week before the opening of the Exhibition, or in the event of any of the judges so

selected failing to act, the Royal Dublin Society, or, should they omit to do so, the Trustees of the Will will nominate one or more judges, so as to make up the number of three. The three judges shall be at liberty, if they think proper, to call in one or two additional judges to assist them. No teacher of Art shall be eligible as judge.

9. All the arrangements for carrying this scheme into operation, and all alterations therein, shall in every case be subject to the approval of the Trustees of the Will for the time being.

10. The work sent in for competition are not to be of less dimensions than the following:

PICTURES IN OILS—The size of the cloth, in surface equal to 29 inches by 36 inches.

WATER COLOUR DRAWINGS—30 inches by 25 inches.

SCULPTURE—The figures to a scale not less than two feet; the models to be *baked* or cast in plaster.

ARCHTITECTURAL DRAWINGS to be as large as a whole sheet of Double Elephant; may be of exterior or interior; to be carefully finished and washed; and if of an existing building, to be from actual measurement.

The Pictures need not be framed.

11. Each work must be accompanied by a brief description of the subject, and also by a statement of the name, age, and birth-place of the artist; of the place where he has studied, and where he shall at the time be actually a student; also by a certificate of his having studied for two years at least in some recognised School of Art; and proof must be given, if required, of the correctness of these particulars, and of the work sent in being actually the production of the party competing.

12. A prize in any one department cannot be obtained by the same student more than twice.

13. Candidates for the Scholarship must be prepared to satisfy the Trustees of their intention to devote themselves to Art as a profession. A Student having obtained the Scholarship, and desiring to retain it for a second or third year, must compete for it by a new work in the Exhibition of each year.

14. Works sent in for competition may be detained a month, if required by the Trustees. No copy or sketch can be made from them without permission of the artist and the Trustees. They may be sold in the Exhibition, if the artist wish.

15. They must be delivered at, and removed from, the place of exhibition at the expense of the student. The trustees will take all reasonable care of the works, but will not be answerable for injury.

16. The judges will examine the works in a private view, and will make their adjudication in writing, with such remarks and recommendations as they may think proper to offer to the Trustees. The Exhibition will then be opened to the public, on such terms and conditions as the Trustees shall determine.

17. The Trustees do not prescribe the precise subjects of the prize works, discrimination in the choice of a subject being regarded as, in some measure, a mark of artistic capability; neither do they put any limitation on the age of the competitors. But in the adjudication every circumstance will be considered with reference to the prime objects of the endowment, namely, the encouragement of the school of art in Ireland, and the development of Irish talent; and the Trustees reserve to themselves the absolute right of determining whether the party competing be strictly a student, and in other respects come within the intention of the Trust.

Communication on the subject of the Taylor Prizes and Scholarships may be addressed to Ralph B. Brunker, Esq., Solicitor to the Executors, 31, York-street, Dublin; or to William Edward Steele, Esq., M.B., Assistant Secretary to the Royal Dublin Society.

For the year 1861 the following Prizes are offered, to be awarded at an Exhibition to be held on the 30th October, 1861, at the House of the Royal Dublin Society:—

1.	For the best Picture in Oil Colours, the subject historical or familiar	£10
2.	For the best Landscape in Oil Colours	10
3.	For the best Composition in Sculpture	10
4.	For the best Water-colour Drawing (subject or landscape)	10
5.	For the best Agricultural Drawing (elevation in perspective, with plans, of some known building, or a Design)	7

The Prizes may be increased or lowered in amount, or may be wholly withheld, according to the merit of the works exhibited.

In addition, a student manifesting high artistic talent may obtain a Taylor Scholarship of £20 or more, which may be held for a second and third year, provided a work of adequate merit be produced in each year.

All works must be delivered before two o'clock on Saturday, 21st October, 1861, at the House of the Royal Dublin Society, Kildare-street, Dublin, where, in the meantime, further particulars may be ascertained.

PLASTIC WOOD.

The following additional information on this subject appears in the *Manchester Examiner*:—

One of the results of the late French treaty has been the introduction into this city of a new product of art and industry, called "bois duré," which will cause quite a revolution in the manufacture of many articles of ornament and general use, and, to judge by the remarkable applications that we have seen, the discovery is a great success. Bois duré, or hardened wood, which has been improperly described as wood softened and then hardened, is made from sawdust, which, under the influence of a high temperature and the enormous pressure of 600 tons, acquires a hardness a good deal exceeding that of wood. It is of a very fine grain, and fears no atmospherical variation; but its principal merit is its adaptation to moulding, and by the most economical processes forms and impressions are given which would require, in any other way, considerable labour and workmanship. We have seen various articles of great beauty manufactured from it, such as writing-desks, inkstands, seal-handles, medallions of royal and public characrers, and even binding for books; on these, carving and the most delicate sculpture are reproduced with the perfection of models, and with exquisite fineness of execution. In Manchester there are one or two places where the products of this new art can be seen

ARTISTIC COPYRIGHT.

A deputation of publishers, consisting of Mr. Graves, Mr. Gambart, Mr. Fores, Mr. Hayward, Mr. Lloyd, and Mr. White, waited upon Sir George Cornewall Lewis, at the Home-office, on Wednesday last, for the purpose of obtaining facilities for stopping, at the Custom-house, piracies of English engravings, and also a more speedy and less expensive remedy against photographers and other producers and sellers of pirated copies of English copyright engravings.

Home Correspondence.

COPYING PICTURES IN PUBLIC GALLERIES.

SIR,—I esteem the space in the Society of Arts *Journal* too valuable to be occupied by individual discussions; and having been permitted to express my opinion upon the practice of copying in our public galleries, founded upon the facts as I view them, I should have left the diametrically opposed opinions of "F. W. R." to the judgment of the readers of the *Journal*; but "F. W. R.," huddling together opinions and facts, accuses me of important inaccuracies, mistakes, vague charges, and surmises,—hard words, for which I should regret to have given any grounds, and equally regret to retaliate. It is only in the cause of truth that I ask to reply to his allegations, from firstly to fifthly.

1st. The notice posted at the gallery at Kensington distinguishes the days of admission as "Free Days" and "Students' Days." But I am corrected by "F. W. R.," who states that the public may be admitted on the students' days on payment of 6d. Now the public, as I stated, is, in fact, excluded by the payment of this fine, levied that the student may enjoy a comparative seclusion; and the public will find, on paying their sixpences, that many of the most popular pictures are hidden from their view by raised platforms, large canvasses, and easels, and, not unfrequently, by idle, gossiping groups of copyists, who look upon the public as intruders if they come between them and the many pictures they hide from view. That the public are at no loss, on the ground of expense on the students' days, as the galleries must in any case be warmed, is surely a very idle argument. There must be some public capital laid out in the galleries, and not a little charge for their maintenance, attendants, and many *et ceteras*, besides coals.

2nd. I am informed, with a protest, that the one year I had assigned to the art student for copying is not enough, and that the period "may safely be taken at from two to three years." I cannot admit any "important inaccuracy" in this. I know that I shall be fully borne out in saying that it would be difficult to find one of our eminent artists who had spent even twelve months in copying.

3rd. There may be found an exception to the general assertion "that copyists never become artists." It is nevertheless true, though "F. W. R." has known many instances. On my part I can assert unhesitatingly, that, having had the pleasure of associating with the greater number of the most eminent artists of the present day, I cannot call to mind one such instance; and it will be some evidence I think of the value which they place upon copying, to add, that the Council of the Royal Academy, not desirous to encourage even the very limited amount practised in their schools, are reported to have recently withdrawn the medals which have been heretofore awarded annually to the students in the school of painting.

5th (for I suppose "F. W. R." expunged his fourth charge on second thoughts). I must repeat the statement which I made with respect to the practice of making replicas by all the best artists, and I trust that "F. W. R." will forgive me the direct contradiction which I feel bound to give to his assertion of the principle of "supply and demand" in such cases.

It would be useless to repeat my opinion upon the merits of "F. W. R.'s" "professed copyists," who subsist "by the moderate amount they wring by the merest drudgery from art." I am sorry for them; they have either been led aside from their true vocation, or have been made mere copyists by the pernicious facilities afforded to them. "F. W. R.'s" reference to foreign galleries appears equally ill-founded. It is but too well known that in those states of Germany and Italy, where the largest class of "professed copyists" may be found in the public galleries, modern art exists only in the most degraded—most debased form.

I will only add that, the subject having been brought under public notice, the evil will find a remedy, despite much better advocates than "F. W. R."

I am, &c., S. R.

January 7th, 1861.

ITALY AND THE INTERNATIONAL EXHIBITION OF 1862.

Sir,—The able paper read by Professor Levi on the 12th ultimo, on "Italian Commerce and Manufactures," and that by Mr. Tansley on "The Straw Plait Trade," on the 19th ultimo, were so complete and exhaustive that they left little room for either criticism or discussion. They were, however, to some extent suggestive, particularly as regards the impending International Exhibition of 1862. This is especially the case with respect to Italy, as the Exhibition will afford to the artistic and industrial population of that country the opportunity of showing that, having achieved a national position worthy their ancient renown, they also aspire to corresponding eminence in the arts of peace. What that was in 1851 and 1855, particularly as regards Naples, I have already explained during the short discussion which followed the reading of the Professor's eloquent paper—what it may be now that all Italy is free, or nearly so, we shall soon have the opportunity of knowing. Freedom of international commercial intercourse must follow in the wake of national and personal liberty, and property being also secure, the industrial capabilities of the whole peninsula will soon be in a train of development.

I cannot say I am one of those who think the success of periodical international exhibitions is materially dependent on the incidence of war or peace. The statistics of commerce—especially of late years, when tranquillity has been disturbed not only in Russia and Italy, but more recently and expensively in India and China—sufficiently demonstrate that the creation of material wealth by labour and skill is, or may be, coincident with the flow of time, the results of experience, and the increase of population. The world cannot stand still, for the mighty impulse which the profitable application of important agencies, long perhaps known, but imperfectly understood, such as gas, steam, and electricity, has given to the loom, the plough, the ship, and the rail, will not only not be arrested by the exceptional condition of war, but will acquire additional force as the old and the new wants of society create demands which must be supplied. At the same time, I am far from undervaluing the advantages which a state of peace confers on these exhibitions; and if, therefore, as I believe, certain portents to the contrary notwithstanding, the present condition of Europe and the East points to comparative repose, it seems to be additionally fortunate that it is decided to hold the next of the series in 1862.

By that time, also, the effects, beneficial, as I confidently anticipate, of the recent commercial treaty with France, and of others nearly concluded, or looming in the distance, will be fully known and appreciated. We desire a point of union, round which the energies of nations, satiated with the glories and the costs of war, may gather, and for this purpose what medium so natural and convenient as the proposed International Exhibition of 1862?

I am, &c.,

THOS. WINKWORTH.

Gresham Club, Jan. 9, 1861.

MECHANICS' INSTITUTIONS.

Sir,—The suggestion offered some time since by Mr. Barnett Blake, to make your *Journal* a medium for interchanging the experience of managers of Educational Institutes, has induced me to trouble you with some thoughts which have arisen from my observations of the progress of a Society formed for the promotion of Mental Improvement.

During the past few years, I have taken an active part in the management of such an Institution, and am perfectly acquainted with every step by which it has advanced to a state of great prosperity and usefulness; and my experience leads me to believe that, where Literary or Mechanics' Institutes become sickly and stunted, they are subject to evils similar to those which retard the growth and impair the health of many children, namely, bad nursing—unwholesome or unsuitable food—and light clothing. Or, to be plain, there is a lavish expenditure of money,—a want of attention to what some persons term trifles, but which are absolutely necessary for the preservation of order—the prevention of disappointment—the eradication of disease. A careless selection of books for the library—thoughtlessness in the engagement of lecturers—no determination to provide that which is generally useful—but the simple securing of certain advantages for privileged classes; whilst ugly sectarianism is employed as a bandage to produce deformity and premature decay.

To secure a successful Institute, the very first things to be considered are, the objects for which such an organisation is required,—and what are they but the allurement (especially of youths and mechanics) from pleasures and scenes which might prove stepping-stones to poverty, disgrace and ruin;—the furnishing of attractive and useful employment for leisure hours;—the stimulation of a spirit of laudable emulation in literary, artistic, or scientific pursuits;—the provision of substitutes for immoral recreation;—the presentation of such objects as are worthy the pursuit of intelligence;—the expansion of the intellectual powers; the elevation of the human mind?

Such, in my humble judgment, is an outline of the great and noble work which Literary and Mechanics' Institutions should be designed to accomplish; and I am persuaded that, without a due appreciation of its importance, and an invincible determination on the part of the managers to keep it full in view, no gilded patronage, or any amount of funds, can ever ensure prosperity. The attempt to prepare a plan of operations which would be completely adapted to the requirements of every locality, would be perfectly futile; but there are some few hints in reference to libraries, committees, lectures, funds, &c., an observance of which has raised the Institution with which I have the honour to be connected, to a most satisfactory position; and I purpose in this letter offering those hints, with the sole desire that they may lead to such inquiry as shall result in the establishment of Societies where none exist, and in the revival of those that are languishing.

That which I conceive to be of primary importance, and which therefore cannot receive too much attention, is the library. Without it there can be no real success; to it every lecture and all class tuition should lead; by means of it the intellectual health of a neighbourhood is affected either for good or ill. And it should, therefore, be distinguished above all things for the excellency of its character. The great variety of opinion as to what constitutes a good library creates one of the greatest difficulties with which managers of Institutions have to contend. To surmount it there must be a clear understanding as to the class of readers for whom provision is to be made. If the Institution is designed for mechanics only, then it should be remembered that, for the most part, they have little time for reading, and that they cannot be expected to occupy their too small amount of leisure in wading through abstruse scientific disquisitions; nor, on the other hand, can the noble minds which many of them possess be satisfied with the attractions of a flimsy novel. Historical works, as those of Macaulay, and Prescott; books of travel, such as "Livingstone's Researches," and "The Voyage of the *Fox*;" biographical sketches, as the lives of Columbus, James Watt, Leigh Hunt, Douglas Jerrold, and George Stephenson; scientific works, in popular forms, as "Lardner's Museum;" and miscellaneous books, as "Self-Help," "Rides and Reveries of Æsop Smith," "Recreations of a Country Parson," may, in my judgment, be considered representative works of a library well adapted to a Mechanics' Institute. In a society consisting only of what may be termed educated people, who can afford to pay liberally for what they require, there will be, of course, the necessity of supplying literary and scientific works of the highest order; and where the subscribers are adults, there may, with propriety, be a sprinkling of what are termed first-class novels.

But if a society is to receive young people of the ages of thirteen and upwards, and if the subscription is so small as to enable all classes to avail themselves of the advantages offered (and I maintain this is the most useful of all kinds of Literary Institutes), then there should be the exclusion of those books which are usually classified as "works of fiction." I urge this upon the principle embodied in the old saying, "What is one man's meat is another man's poison." An educated man, endowed with moral excellencies, and plenty of that invaluable commodity, good "common sense," may occasionally read the works of Charles Dickens and other writers of fiction, and receive no injury whatever. He would know how to curb the disposition, which is so easily excited, to read such books excessively, but it is far otherwise with the youth of sixteen. Just at the period when his tastes and habits are being formed and strengthened, it is evidently a duty binding upon those who undertake to provide for his mental recreation and intellectual pursuits, carefully to avoid placing within his reach such literature as may either directly or indirectly give to him an unfavourable mental bias. He requires an agreeable, yet effective, bracing up to do battle with indolence and self-indulgence, impurity, and foppish display. From the shelves of the library there should be thrown upon his pathway rays of light, which will give increased radiance to every virtue, and scorch vice into blackness.

It must not for a moment be supposed that I am advocating an attempt to provide young men only with dull, heavy, serious reading; far from it, I would give them access to works of general interest, written in the most attractive style, but do not tempt them with that which would foster a desire to read nothing but works of fiction.

Between what are commonly called "good books," and those which we generally understand to constitute "light literature," there is a long and ever-increasing range of books, exceedingly attractive and highly recreative, and it is from this class that I would recommend the selection of libraries for such Literary or Mechanics' Institutes as are designed to benefit all ages and all classes of society. I am well acquainted with a library of this kind, and I have taken great pains to compare the circulation with that of libraries where there is a preponderance of works of fiction, and I find that the result of my calculations is considerably in favour of the course which I have described.

To render any library attractive, it must be borne in mind that there must be constant additions of new books, and copies of any work which is likely to be in great demand should be procured on the day of publication, and as soon after as possible second-hand copies should be purchased; want of funds will often prove a great hindrance here, but in another letter I shall attempt to show how easily such an obstacle may be removed. Let all books be neatly covered and numbered, and upon a label affixed to the side state the number of days allowed for reading—be liberal in this matter. Be careful in the appointment of librarians; they should be gentlemen noted for their punctuality, patience, perseverance, politeness, and painstaking. Their eyes should be quick to discern the condition in which books are returned, so that all necessary repairs be attended to as soon as required. And once a year (but only in the summer) the library should be closed for a few days, that stock may be taken, and soiled covers removed.

Attention to the foregoing, and especially to what I have ventured to write upon the selection of books, will, I am convinced, ensure success in the establishment of Literary or Mechanics' Institutes.

I am, &c.,
FREDERICK W. MONK.

Faversham, Oct. 15, 1860.

MODERN HOSE.

SIR,—Our worthy friend and associate, Mr. W. Bridges Adams, asks the men of Manchester and Leeds how to solve the question of getting good stockings of the best wool, &c. The question is easily solved, viz., pay a price for them, and order them in large quantities. Stockings, like steam-engines, sell best at low figures, by which the public pay the piper and the middle-men get the pence. A shopman, or dealer in goods of all kinds, orders showy goods to sell at low figures; the manufacturer, of course, makes goods to suit his orders. Cent. per cent. is gained by selling imitation of wool stockings, and perhaps not more than 10 per cent. is gained by selling good wool stockings. The shopkeeper very naturally asks, Why should not I order the goods I get the most out of? and as Mr. W. B. Adams is an old manufacturer of steam-engines and first-class machinery, I have no doubt he was often cut-out of the trade by dealers selling lower than he could as a manufacturer. When some dealers order goods, they state fearlessly that they must have so and so, of certain sizes, and the quality must resemble the best goods; by which means he (the dealer) can come into the market and undersell a first-class manufacturer. This is the way that dealers make their fortunes, whilst manufacturers can scarcely earn a living, and the public do not get what they ought to have.

I am, &c., THOMAS DUNN.

Manchester, Jan. 8th.

SIR,—In reference to Mr. Bridges Adams's letter on "Modern Hose," and their almost universal rottenness, may I be allowed to remark that I felt somewhat scandalised some two years ago, when I listened at our Society to a paper on "Shoddy," and found that of the members present some considered shoddy rather a good joke, while others regarded it as an excellent illustration of British skill in using up waste materials. To me shoddy has always appeared an unmitigated sham; and when the poor of this country, believing that they are buying good strong cloth, are treated to shoddy, it seems a somewhat diabolical sham.

This sham, or shoddy, runs through almost everything one buys, and modern stockings form no exception.

I am glad, however, to say that this evil of rotten stockings may be shortly, to some extent, mitigated.

A lady has made some inventions in the manner of knitting stockings, so as completely to obviate the necessity of wearing garters, by which the comfort of all now wearing garters may be increased, and many cases of swelled ankles and varicose veins may be benefited.

It is in prospect to form a society in London to teach the knitting of these stockings to young children, either at school or out of school, so as to pay about sixpence a day to hundreds, if not thousands, of children now considered unfit for any kind of labour.

If this is carried out, and good knitting wool can be purchased, I think I can thus promise Mr. Bridges Adams and all such of Her Majesty's subjects as may desire a good-fitting and good-wearing genuine stocking, something very different to the rotten scarlet, purple, and other woollen hose which now adorn our pavements at the expense of the purses and tempers of all fathers and mothers of families.—I am, &c., GEO. WYLD, M.D.

PRESERVATION OF FOOD.

SIR,—Referring to Sir Charles Elliott's communication relative to the preservation of animal food, and fully recognising its importance and his excellent suggestions, I beg leave to mention a difficulty, which may perhaps be overcome. Fresh meat may be preserved good for a considerable time in an ice-well, and, if cooked directly it is withdrawn from the influence of the ice-pan, it will be an excellent dish for the table; but, if not cooked at once, it soon becomes tainted and unfit for food.

This fact may and will cause a difficulty in dealing with large stores of meat; the knowledge however, if made public, may lead some ingenious person to overcome it.

I am, &c.,
G. N. H.

Proceedings of Institutions.

◆

AVENHAM (PRESTON) INSTITUTION FOR THE DIFFUSION OF KNOWLEDGE.—The Thirty-second Annual Report states that, in the proceedings of the past year, there is much to call for congratulation, for, in some important respects, the Institution has taken up a position much more satisfactory than could have been claimed for it in any previous year. In particular, it may be pointed out that the advance in the rate of subscription, sanctioned at the last annual meeting has now become established; and further, that a Government School of Art now forms an important feature in the Institution. The means of increased revenue, secured by the rate of advance in the subscription, cannot fail to be ultimately productive of the most beneficial results. For, great as may have been the success of the Institution hitherto, it has had to contend with a difficulty in its former insufficient rate of subscription, which had the effect of seriously crippling its usefulness. This difficulty removed, it has become now much more practicable to develop the entire capabilities of the Institution, capabilities which, though valuable in the highest degree, have remained in abeyance owing to the want of adequate means for their development. It is true that the immediate effect of the change in the rate of subscription has been to reduce the number of members, the number for the present year being 562 against 706, the number for the year previous. This, however, is not more than was looked for; and there is no reason to doubt that the ground thus temporarily lost will be more than recovered in the coming year. To the establishment of the School of Art the Council refer with peculiar satisfaction. This long desired addition to the usefulness of the Institution has been acquired without trenching upon the general funds; and further the school will, at no distant time, contribute to the pecuniary resources, as it already adds so greatly to the importance of the Institution. The usual evening classes have been in operation during the year, and have been, on the whole, well attended, the male classes especially, by students such as it is desirable to see in attendance, viz., young men from 16 to 25 years of age. Some of the students, having successfully passed the examination of the Institutional Association of Lancashire and Cheshire, were awarded prizes by the Association. These prizes the students had the gratification of receiving at the hands of the Right Honourable B. Disraeli, at the anniversary meeting of the association, held in the Free Trade Hall, in Manchester, on the 1st November last. Although the efficiency of the evening classes has been fully proportioned to the means the Council have hitherto been able to devote to their requirements, much yet remains to be done in the way of adding to their efficiency; and the present Council would suggest that the attention of their successors could hardly be given to a more important question than that of the development of the capabilities of the Institution for class instruction. In particular, it may be pointed out that it is exceedingly desirable that, in addition to the present classes, others should be attempted, especially classes for the study of history, political economy, and languages. Several lectures were delivered during the last season gratuitously. The library still continues to increase, though not so rapidly as to keep pace with the demands of the readers. The number of volumes at present on the shelves is 6,336. The number added during the present year is 204, of which seven have been presented, and 197 have been purchased by the Council. The reading room continues to attract a large attendance; and the high class literature, to be found in such abundance on the tables, finds numerous readers. The penny bank loses none of its interest with the public. On the contrary, a considerable increase is shewn, both of depositors and deposits. Although there has been no diminution in the supply of books and periodicals during the year, nor any lessening in any other way of the efficiency of the Institution, it will be seen, on reference to the accounts, that the balance at debit of the General Fund has been reduced from £69 3s. 6d., the amount at the beginning, to £58 3s. 11d., the present amount. A sum equal to nearly one-half of the amount expended in books resulted to the funds of the Institution, as the proceeds of the Annual Soirée. Further additions to the year's income have accrued from the Class soirée held in the institution, under the management of the members of the female class, and from an entertainment given in the theatre of the institution by the Young Men's Elocutionary Society. The site of the institution has, during the year, been enlarged by the purchase of an adjoining plot of land. Through the liberality of the trustees of Goosnargh hospital, the owners, the land has been obtained on extremely favourable terms, and although the purchase entails an additional charge upon the funds of the institution, the necessity for the purchase was imperative. The institution still retains its connection with the Society of Arts, and the Institutional Association of Lancashire and Cheshire; and, at the suggestion of the Bishop of Manchester, it has also been placed in connection with the Arundel Society for Promoting the Knowledge of Art. The number of volumes issued from the library during the twelve months was as follows:—Arts and sciences, 1,464; Magazines (bound), 1,702; Voyages and travels, 1,358; History, 712; Biography, 945; Poetry and the drama, 599; Novels, 7,257; Miscellaneous, 1,007; Translations, 48. Total, 15,092. The state of the penny bank is as follows:—Accounts open Oct. 2nd, 1859, 1,826; Accounts open October 2nd, 1860, 8,029. Amount due on depositors' accounts, October 2nd, 1859, £391 2s. 10d.; Amount due on depositors' accounts, October 2nd, 1860, £620 19s. 7d.

Bucks and Berks Adult Education and Improvement Association.—The report for 1859-60, presented at the annual meeting, Thursday, June 28th, 1860, the Hon. and Rev. C. L. Courtenay, Canon of Windsor, in the chair, states that it is proposed to alter the name of the Association from the "Bucks and Berks Lecturer's Association," &c., to the "Bucks and Berks Adult Education and Improvement Association," which more distinctly expresses the objects proposed to be attained. There are at present in connection with the Association seven Institutes:—Windsor, Staines, Slough, Beaconsfield, Amersham, Chertsey (which joined it this year), Maidenhead. Eleven Reading-rooms and Libraries:—Burnham, Colnbrook, Eton, Cookham, Chalvey, Cumberland Lodge, Taplow, Windsor Working Men's Association, Wooburn, Clewer, Clewer-road; and six Class-rooms:—Cranbourne, Clewer-road, Shaw Farm, Windsor Working Men's Association, Windsor National School Night School, and South-place Night School. For all these the Association forms a bond of union by the Prizes offered for competition to the members and pupils, and the assistance rendered the teachers by the scale of gratuities. The operations of the Association are at present limited to the following branches:—1. The supplying of gratuitous lectures to the various class-rooms, reading-rooms, and Institutes in union. 2. The encouragement of night schools by gratuities to Institutes, and teachers, and pupils, according to its published scale. 3. The holding of an annual examination, at which prizes are awarded. 4. The acting as a local Board of Examiners in connection with the Society of Arts. There has been an increase of lectures during the past winter, the total number given by members being 32. Of this number 20 have been delivered by clergymen, and 12 by laymen. From returns of various night schools in connection (as far as they have come in) it appears that during the past winter there has been on the attendance roll of Windsor Working Men's Association, 53; Cranbourne, 30; Slough Drawing Class, 30; Windsor Drawing Class, 15; Iver Night School, 36; Shaw Farm Night School, 17; Wooburn Night School, 20; Colnbrook Night School, 47; Windsor National School Night School, 24; making a total of 272 men and lads attending from time to time, and to this may be added those attending schools from which no returns have been received. The prize of £2 to the Institute whose members having numbered 50, had the greatest number of pupils for classes in proportion to the number of members, was adjudged to the Windsor Working Men's Association. A prize of books was given to the pupil in each school who was absent fewest times from his class. The local examinations of the Association were held during the week commencing March 19. There were in all 48 candidates, and the following is a list of the various subjects:—Euclid, Arithmetic, Geography, History, French, English Grammar and Composition, Dictation, Practical Geometry, Drawing, Abstract of Lectures, Original Essay, Writing. In all the above subjects (save French and the Abstract of Lecture) prizes have been adjudged, and the answering was generally very creditable, and on some subjects evinced a decided improvement over the former year. With respect to the entire result of the Examination, the Committee feel cause for congratulation, not only on the progress made by the prizemen, but also on the more widely-extended interest felt in the matter. The Committee congratulate the Association on this being the first year that an Examination has been held by it in connection with the Society of Arts. It is true only two candidates presented themselves, but it is well even thus to make a beginning. The Committee hope that many more candidates will present themselves for these Examinations next year, and it is in contemplation to form the next prize scheme of the Association with special reference to that of the Society of Arts. An appendix is published to this report, in which notice is given that the following prizes, &c., are offered for competition for the season of 1860-1861:—I.—A gratuity of £2 2s. is offered to the Institute or reading-room, whose members having numbered fifty at any time during the winter, shall (in proportion to the number of members) have had the largest number of pupils attending classes. II.—For Attendance. *A.* A present of books to the pupil in each night school who shall have attended with most regularity during a course of not less than four months, the school being held at least three times a week. *B.* A money prize to the teacher of any school or class half of whose pupils have attended three-fourths of the entire course. *C.* A payment to the teacher of twopence per hour for every hour the classes are held. III.—For superior answering and proficiency at the annual examination to be held in March, 1861. *A.* 1. A prize of £1 to the member of an Institute, reading-room, adult class, or night school, who shall pass with most credit an examination in the following subjects, viz.:—Arithmetic (simple and compound rules), geography, history, English grammar, writing from dictation, composition. 2. A prize of 10s. to second best in above. 3. 7s. 6d. third. *B.* 1. A prize of £1 to the best answerer in Euclid, mensuration, practical geometry, arithmetic (advanced). 2. A prize of 10s. to the second best answerer in above. *C.* A prize of 10s. to the scholar of a night school whose writing shall show the greatest improvement during the season. (The improvement to be judged of by copy books selected by the manager of the school.) *D.* A prize of 10s. to the scholar of a night school or class who shall answer best in the first four rules of arithmetic, and who is certified by the manager of the school or class as unable to compete in the higher classes. (If there are a sufficient number of candidates a second prize will be adjudged.) *E.* 1. A prize of 15s. for drawing from casts. 2. A prize of 15s. for drawing copies in outline. 3. A prize of 10s. for drawing architectural designs (copies). 4. A prize of 15s. for drawing architectural designs (original). *F.* A prize of £1 for the best translation from French into English, and English into French. *G.* A prize of £1 for best abstract of a lecture or course of lectures, delivered in the Institute or reading room during the season 1860-61. Due notice of the days of examination in March or April will be given, and the papers forwarded. No candidate who has obtained the first prize in any year can be allowed to compete again in the class in which the prize has been obtained, but may be examined in it for a "passed" certificate to the Society of Arts examination.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Geographical, 8½. Mr. J. Macdougall Stuart, "Journal of the Expedition across the centre of Australia, from Spencer Gulf on the South, to latitude 18° 47′ on the North."
Medical, 8½. Clinical Discussion.
Tues. ...Civil Engineers, 8. Continued Discussion upon Mr. Preece's Paper, "On Submarine Telegraph Cables."
Statistical, 8. Prof Leone Levi, "On the Progress of the Public Expenditure of the United Kingdom."
Pathological, 8.
Wed. ...Meteorological, 7.
London Institution, 7.
Society of Arts, 8. Dr. Edward Smith, "On Recent Experimental Researches on the Nature and Action of Alcohols as Food."
Thurs....Roy. Soc. Club, 6.
Linnæan, 8. 1. Mr. M. T. Masters, "On Prolification in Flowers." 2. Dr. Welwitsch, "On the Botany of tropical Western Africa."
Chemical, 8. 1. Dr. Noad, "On the Analysis of the Saline Water of Purton, near Swindon, North Wilts." 2. Prof. Bloxam, "On the Electrotype Test for Arsenic."
Royal, 8½.
Antiquaries, 8½.
Fri. ......Royal Inst., 8. Prof. Tyndall, "On the Action of Gases and Vapours upon Radiant Heat."
Sat. .....Asiatic, 3.
Royal Inst., 3. Prof. Tyndall, "On Inorganic Chemistry."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, January 4th*, 1861.]

Dated 13th October, 1860.

2491. M. Strang, otherwise Hutchison, Glasgow—Imp. in the manufacture of lubricating oil.

Dated 29th November, 1860.

2928. Sir J. T. Bethune, Bart, 39, Rue de l'Echiquier, Paris—Imp. in the production of motive power by application of the dead weight of liquids, and in the apparatus connected therewith.

Dated 1st December, 1860.

2947. A. Jackson, Liverpool—Imp. in generating steam as adapted to a certain arrangement or construction of steam engines for transmitting motive power.

Dated 8th December, 1860.

3016. L. Simon, Nottingham—Imp. in heated air engines.

Dated 15th December, 1860.

3083. Lieut. N. C. Barton, R.N.—An improved scaling ladder for military, naval, and other purposes.
3085. G. Davies, 1, Serle-street, Lincoln's-inn—Certain imp. in rolling and corrugating plates of metal, and in machinery or apparatus employed for such purposes. (A com.)
3087. J. G. Williams, Blaenavon, Monmouthshire—Imp. in extracting inflammable and other noxious gases from coal and other mines.
3089. A. Prince, 4, Trafalgar-square, Charing-cross—Imp. in steam-engines. (A com.)

Dated 17th December, 1860.

3095. R. Bodmer, 2, Thavies-inn, Holborn—Imp. in machinery or apparatus for preventing or modifying the effects of collisions on railways. (A com.)
3097. A. Denny and E. M. Denny, Waterford, Ireland—Imp. in apparatus for singeing the carcasses of dead pigs.
3101. T. W. Walker, Poole, Dorsetshire—Imp. in the manufacture of ornamental bricks, tiles, and other articles of a similar nature, and in the machinery or apparatus employed therein.

Dated 18th December, 1860.

3103. E. Silas, 4, Leicester-place, Leicester-square—An aerostatic signal apparatus, to be called "Semasphere."
3107. R. W. MacArthur, 38, Chapel-street, Belgrave-square—Hulling and dressing rice and other grain. (A com.)
3109. R. A. Brooman, 166, Fleet-street—Imp. in spears for cutting sheet metal and other materials. (A com.)
3111. J. Paterson, Wood-street—An improved neck-tie.

Dated 19th Deeember, 1860.

3115. J. W. McGauley, Pimlico—Imp. in means or apparatus for preventing collisions on railways.
3117. O. Blake, Southampton-street, Strand—Imp. in the manufacture of that description of glass termed plate glass.
3119. M. Henry, 84, Fleet-street—Imp. in the manufacture of colours applicable for various uses in arts and manufactures. (A com.)
3121. R. A. Brooman, 166, Fleet-street—Imp. in the treatment of caoutchouc, and the employment of a product obtained thereby, for lubricating and coating bodies. (A com.)
3123. C. W. Robinson and J. Robinson, Jun., Mount Kennett, Limerick, Ireland—The singeing of the hairs off pigs after being killed, without letting the flames or smoke from the fires come in direct contact with the pig.

Dated 20th December, 1860.

3127. J. Clarke, Jun., Longford-street, Rochdale—Imp. in warping.
3129. G. Hadfield, Carlisle—Imp. in the preparation of wood for the conversion into casks or barrels, and in machinery to be used for that purpose.
3131. F. B. Baker, Sherwood-street, Nottingham—Imp. in the manufacture of lace.
3133. E. Whitehall, Nottingham—Imp. in machinery for embroidering on lace and other fabrics.

Dated 21st December, 1860.

3135. W. Price, 4, Wood-street, Lambeth—Imp. in the manufacture of articles called shives, tits, bungs, and corks, or other conical bodies, whether made out of wood, cork, or any other substance.
3137. H. Loveridge, Wolverhampton—Imp. in meat screens.
3139. T. Moore, 33, Regent-circus, Piccadilly—Imp. in navigating ships.
3141. T. Hunt, Crewe, Chester—Imp. in apparatus for supplying steam generators with water.
3143. J. Glover, Dane's-inn, Strand—Imp. in mounting and affixing opaque letters or numerals on a translucent ground.

Dated 22nd December, 1860.

3145. J. Johnston, 1, Pond-street, Hampstead—Imp. in apparatus for withdrawing corks from bottles.
3147. H. Hughes, Loughborough, Leicestershire—An improved method of making wheels for carts, waggons, and carriages for common roads and railways.
3149. T. B. Marshall, 41, Queen-street, Cheapside—Imp. in wind musical instruments.

Dated 24th December, 1860.

3155. C. H. Adames, Birmingham, and C. Whitehouse, Wolverhampton—A new or improved mode of manufacturing frying-pans, and other articles produced from sheet iron or other metals.
3157. J. A. Fanshawe and J. A. Jaques, Tottenham—Imp. in the manufacture of fabrics with rubbing or friction surfaces.
3159. J. L. Norton, 38, Belle Sauvage-yard, Ludgate-hill—Imp. in apparatus for drying wheat, barley, and other grain and seeds.

Dated 26th December, 1860.

3161. F. Puls, 25, Francis-terrace, Hackney Wick—Imp. in obtaining products from coal, gas tar, gas pitch, coal tar, asphalte, resin, and other bituminous and resinous substances.
3163. S. Desborough, Noble-street, and S. Middleton, Essex-street, Strand—Imp. in the manufacture of boots and shoes, and in the means and apparatus employed for uniting and preparing surfaces of leather and similar materials for this and other purposes.
3165. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in smoothing irons. (A com.)

Dated 27th December, 1860.

3167. F. Sage, 11, Hatton-garden—Imp. in brackets for carrying trays, shelves, glass cases, &c., in windows and glass cases.
3169. J. T. G. Stone, Gopsall-street, Hoxton—An improved method of covering steel used for ladies' crinolines, and other articles of dress.
3171. T. V. Guerrée, L'Aigle, France—An apparatus for moving waggons or carriages on railways.
3173. R. Parnall and H. Parnall, Bishopsgate-street Without—Imp. in means for promoting warmth and comfort in railway and other travelling.
3175. G. Dodman and W. Bellhouse, Rochdale—Imp. in thoists.

INVENTION WITH COMPLETE SPECIFICATION FILED.

3193. B. Nadault de Buffon, 28, Rue des Saints Pères, Paris—Imp. in apparatuses for clarifying and purifying water and other liquids.—31st December, 1860.

PATENTS SEALED.

[*From Gazette, January 4th*, 1861.]

January 2nd.
1620. J. Savage.
1627. J. Ogden.
1654. W. H. Pritchard.
1665. E. Franquinet.
1783. W. Clark.
1882. W. E. Newton.
1884. W. E. Newton.
2717. W. Hewitt.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, January 4th*, 1861.]

January 1st.
58. J. P. A. Couder.

January 2nd.
16. J. Leeming & J. C. Ramsden
181. J. Childs.

[*From Gazette, January 8th*, 1861.]

January 3rd.
14. J. Ellis and J. H. Ellis.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, January 4th*, 1861.]

January 2nd.
8. H. L. Corlett.
27. J. Mason and L. Kaberry.
47. R. A. Tilghman.
369. G. F. Wilson.

[*From Gazette, January 8th*, 1861.]

January 3rd.
17. J. Bernard.